

Friction Roller for the Driving of a Bobbin and Support

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The present invention relates to a friction roller for the driving of a bobbin according to the introductory clause of claim 1 as well as a support of a friction roller to drive a bobbin on a textile machine.

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A friction roller of this type is known from EP 0 063 690 A1 and is used to wind up yarns into a bobbin on a rotatable pirn. The friction roller consists of several rotatable segments placed one next to the other on a common shaft. The middle segment is connected non-rotatably with the shaft and coupled via a gear to the two lateral segments of the friction roller. The middle segment has greater friction on its outer surface relative to the bobbin for the purpose of improved driving of the bobbin. DE 44 31 087 A1 discloses that on a single-segment friction roller its center is coated with a coating of oxide ceramic, while the areas on either side thereof are not used to drive the bobbin. The application of the coating is very awkward since the entire friction roller is involved in the process.

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20 Furthermore the entire friction roller must be replaced when the friction coating is worn. This is especially very costly and requires much work on spinning machines with a plurality of winding stations next to each other.

For a safe and reliably driving of bobbins, in particular at higher winding speeds, and for conical bobbins, the known friction rollers are not suitable, nor are they suitable for the convenient replacement of the friction coating of the winding roller. The central area of a

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bobbin at an especially advanced winding stage has a softer consistency, so that the friction roller cannot drive the bobbin in this area in a satisfactory manner.

It is therefore the object of the present application to propose a friction roller and a
5 support avoiding the disadvantages of the state of the art.

This object is attained through the invention by a friction roller and a support according to the characteristics of the independent claims.

10 Due to the design according to the invention of the friction roller with a support on which it is mounted, whereby the support is provided with a friction coating, the obtained result is that it is possible to ensure that a favorable frictional value is provided between bobbin and friction roller independently of the nature of the material of the friction roller in order to drive the bobbin. The support can be installed advantageously at a location of the
15 friction roller where the driving of the bobbin can be carried out especially gently and safely, while the other areas of the friction roller are not participating directly in driving the bobbin.

Due to the design of the friction roller with a support it is possible to determine the
20 frictional value of the friction roller independently of its basic material and to provide it with a frictional value as well as with a coarseness by means of which the bobbin can be driven reliably and also gently. The basic material of the friction roller as well as the basic material of the support is therefore not of decisive importance in driving the bobbin. Therefore materials can be selected so as to have suitable characteristics, in particular

also for the support, since the driving of the bobbin does not depend on the support itself but on its friction coating.

In an especially advantageous further development of the invention the sections of the friction roller are made in several parts, whereby the two sections constitute the components of a ring and each section reaches around the friction roller by more than 180°. This is achieved in that the ends of the sections reach into each other so that a section can reach around the friction roller by more than 180°. This makes it possible for the sections to attach themselves to the friction roller with a clip-type connection. With this type of design a simple and secure attachment is achieved without any other contrivance.

The support is most advantageously made of metal, as this provides on the one hand the advantage that many different friction coatings can be placed on a support of this configuration, and on the other hand that the support is subjected to practically no design limitations since metal can be worked and formed in a most flexible manner. Different methods can be used to securely form a friction layer on metal and to deposit components such as e.g. hard-material granules on it. Metal is furthermore flexible, elastic, easily worked and economical. In addition it is able to assume a stable form even with thin walls, such as could not be realized for example with friction coatings made of rubber.

In an especially advantageous embodiment of the invention the friction layer is made of metal ceramic, i.e. in that ceramic components are imbedded in a metal matrix. Thanks to the metal matrix which combines very advantageously with a metal support, the most

varied solid components offering a coarse surface can be fixed on the support. Thus for example ceramic components such as oxide ceramic or silicon combinations as well as other hard-material granules, e.g. carbides such as silicon carbide or also diamond granules can be used. Such hard-material granules have the advantage that they allow for a precise adjustment of the coarseness of the friction coating. In addition these components offer the advantage that they are subject to very only little wear so that the friction coating has a long life.

In an advantageous further development of the invention the friction coating can be applied e.g. by flame spraying, whereby a metal powder is heated by means of a gas flame and can be applied together with ceramic components on the support. In an especially advantageous further development of the invention, the friction coating is applied to the support in a coating process by means of plasma coating.

In another advantageous further development the friction coating of the support is produced by precipitation from a chemical coating bath. Without significant use of electric current or heat, a metal is precipitated from an emulsion on the support in this case, whereby at the same time hard-material components present in the solution are also deposited and incorporated into the precipitated metal. In this process the coating has practically no influence on the form or the strength of the support.

The support is most advantageously made of steel, as steel has great dimensional stability and is furthermore easy to work and to coat. By using aluminum as the metal of the support, a support can be realized that is especially light, so that not much influence is

exerted upon the acceleration capability of the friction roller. Brass is also a metal that can be used advantageously for the support. It is especially insensitive to oxidation and is easily workable.

- 5 A ring-shaped support is especially advantageous as in the form of a ring it is able to cover the entire circumference of the bobbin roller and can furthermore be designed with a width that is advantageous in driving the bobbin. Through the width of the support it is possible to make adjustments determining exactly the area of the bobbin over which it is actually to be driven by the friction roller. This is especially advantageous with conical
- 10 bobbins or to drive bobbins with varying hardness over their width.

The support is designed most advantageously as a component consisting of several elements, and this can facilitate its installation on the friction roller considerably. The multiple elements make it possible to replace a worn friction coating of the friction roller

15 without disassembling the bobbin roller.

The multiple-elements support consists most advantageously of elements that together form a ring, so that again a ring-shaped support is created. For this purpose the individual elements of the support are curved so that when they are placed one after the other in the

20 direction of the circumference they form an uninterrupted ring. Thus it is especially easy to replace the worn friction coating of the friction roller without having to disassemble the friction roller. For this the support is advantageously possible to attach the support on the friction roller, i.e. means are provided on the friction roller and/or on the support to attach the support on the friction roller.

In an embodiment with a multi-part support it is especially advantageous to design the sections in such manner that they can be connected to each other. This makes it possible to attach the sections on the friction roller following assembly, essentially without any
5 further fastener, in that the two sections attach themselves to each other and thus produce a closed ring. Attachment is especially advantageous in that a positive connection is produced, as it possesses especially advantageous strength. This attachment is advantageously designed in form of a clip connection. Thanks to this connection, no further fastening means are needed. In another advantageous embodiment of the
10 invention the sections are pinned together so that a precise fitting together of support sections is made possible.

In addition to a design of a ring-shaped two-part support it is advantageously also possible to provide for three or more sections that either must be attached individually on
15 the friction roller or advantageously can be connected to each other, e.g. by means of a clip connection.

In an especially advantageous further development of the invention the friction roller consists of several segments lined up axially and rotatable relative to each other. This
20 makes it advantageously possible to support bobbins with different rotational speeds as considered in the longitudinal sense on the friction roller and to drive them. This applies in particular to conical bobbins. With this type of design of the friction roller, individual segments or only one segment can be selected to drive the bobbin. Accordingly this

segment is then equipped with a support with a friction coating according to the invention.

In an especially advantageous further development the friction roller has at least three
5 sections, so that when three sections are present, only the middle one can drive the bobbin, e.g. in case of a cylindrical bobbin, or else only the outer sections can also be used for a cylindrical bobbin, but also for a conical bobbin, especially if the friction roller is provided with a differential gear.

10 In an especially advantageous further development of the invention the support can be disassembled so that it may be removed if necessary and can be replaced by a new one. It is furthermore advantageous if a support is made with protuberances or openings on which a fastening means can take hold. For this purpose the support can be designed e.g. with a clip connection, and this can also be the case for multi-element supports, so that
15 the sections of the support attach each other mutually and thereby attach the support to the friction roller. In an advantageous further development an inventive opening for the attachment of the support consists of a bore for the passage of a screw or of some other similar fastening means.

20 It is especially advantageous if the friction coating has an outside diameter that is greater than the outside diameter of the other areas of the friction roller. As a result the other areas of the bobbin are practically not driven, so that a defined driving of the bobbin can take place. It is especially advantageous if the friction coating has a crowned contour for this, so that a secure position of the bobbin on the friction coating is possible.

In an especially advantageous further development of the invention, the segments of the friction roller at the front of the friction roller are designed to drive the bobbin. For this purpose each is provided with a support with a friction coating. In an especially
5 advantageous further development the support and the friction roller have means that prevent the support from co-rotating on the friction roller. This can be achieved advantageously in form of positive connection between support and friction roller, or else by means of a frictional connection, such as through clamping elements made e.g. of a rubber-like material located between support and friction roller.

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A support according to the invention is provided with a friction coating and made in several parts. It consists of curved sections, and each of the sections reaches around the friction roller by more than 180°.

15 The invention is explained below through drawings.

Fig. 1 shows a view of a friction roller consisting of three axially aligned segments,

Fig. 2 shows a top view of a forward segment of the winding roller of Fig. 1, with a
20 support,

Fig. 3 shows the section A – A of Fig. 2 with pins to fit together the parts of the multi-element ring-shaped support,

Fig. 4 shows the detailed view X of Fig. 3,

Fig. 5 shows a lock washer as shown in Fig. 2,

- 5 Fig. 6 shows part of a two-part support, whereby each half of the two-part ring reaches around the friction roller by more than 180° .

Fig. 7 shows a view in perspective of part of the ring of Fig. 6,

- 10 Fig. 8 shows a section of the friction roller without a support,

Fig. 9 shows a clip connection between the ends of support sections and

Fig. 10 shows a view of part of another ring in perspective.

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- The friction roller 1 of Fig. 1 consists of three segments 11 axially aligned, whereby the two outer segments 11 are equipped with a support 2. The supports 2 are provided with a friction coating containing hard-material granules that has been applied in a coating process. Each of the three segments 11 of the friction roller 1 is provided in its center
- 20 with a bore 12 that receives a shaft (not shown) when the friction roller 1 is installed.
- Each of the supports 2 of the two outer segments 11 consist of two curved sections 21 that but against each other at a joint 22. Each of the curved sections 21 reaches around the friction roller 1 by slightly less than 180° , so that because to the joints 22 the friction

roller 1 is not surrounded over 360° by the support 2. This is however of no importance in driving the bobbin.

- Each of the sections 21 is provided with a bore 23 in which a screw 24 is seated and by means of which the curved sections 21 are attached on the segments 11 of the friction roller 1. The friction roller 1 is designed as a so-called differential winding roller that is used especially to drive conical bobbins. In that case the shaft drives the central segment 11 through which the two lateral segments 11 are driven, whereby this driving takes place via a differential gear so that the two outer segments 11 rotate at different speeds so that a conical bobbin can be driven by the two lateral segments 11 without slippage in their outer regions. Accordingly only the lateral segments 11 are provided with a support 2 since the central segment 11 does not contribute significantly in driving the bobbin. It basically serves only to support the bobbin in the center.
- The curved sections 21 therefore constitute a support 2 made in form of a ring, whereby the ring is in two parts as shown in Fig. 1. It is of course also possible for the ring to consist of more parts, e.g. four parts, which must also be attached to the friction roller 1 for instance. This attachment can be by means of a screw, as in Fig. 1, or also in that the individual curved sections 21 attach to each other, e.g. hook into each other, e.g. via a clip connection (see Fig. 9). It is however also possible to consider a support 2 made in form of a slit ring, so that it can be widened at the joint 22 and so that it can be guided over the shaft (not shown) and can be thus mounted on the friction roller 1 without requiring its removal from the shaft. Such fastening possibilities of the support 2 or of the embodiments of the support 2 are preferred to a closed support 2 in one piece when a

friction roller 1 already mounted on a spinning machine is to be fitted out with a new support.

Attaching the support 2 by means of a screw 24 to the friction roller 1 ensures at the same
5 time that the support 2 rotates together with the friction roller. Only this makes it possible
to drive the bobbin in a controlled manner. If a support 2 that is not screwed on is used, it
is possible to provide the segment 11 e.g. with elastic rubber elements in order
to prevent the support 2 from also rotating see Fig. 8 and the support 2 is then pushed
axially over these elastic rubber elements, causing them to become deformed and to
10 constitute a frictional connection between the support 2 and the segment 11 as a result of
their tension.

Fig. 2 shows a lateral segment 11 of the friction roller 1 of Fig. 1. The lateral segment 1
consists of two regions, whereby the outer region on the right side is provided with a
15 support 2. The support 2 is formed of two curved sections 21 so that it can be mounted on
the segment 11 without having to remove a drive shaft of the friction roller 1. In addition
the support 2 is seated in a depression of the segments 11 (see Fig. 8) so that it need not
be pushed laterally on the segment 11 because of the border 15. Therefore a support 2 in
several parts is required.

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To attach the support 2 which consists of its curved sections 21, these are furthermore
connected to each other. The connection is made through a lock washer 14 located on the
side of the outer circumference of the curved sections 21 and holding them together
radially. In addition the two curved sections 21 are pinned to each other. The pinning is

recognizable in the section A-A shown in Fig. 3. In addition the two curved sections are provided with a bore that is filled by a pin in the assembled state.

The lock washer 14 is located laterally on a projection of the curved sections so that it
5 does not extend beyond the outer circumference of the support 2. A lateral shifting of the
lock washer 14 is not possible because the segment 11 has a border 15 on its outside
against which the lock washer 14 is pressed. In the drawing of Fig. 2, the joints 22
between the two curved sections 21 of the support 2 are not recognizable. In the section
shown in Fig. 3 they become clearly visible, whereby the joints 22 are bridged by the pins
10 25.

Fig. 4 shows the detailed drawing X of Fig. 3. The two curved sections 21 are connected
to each other by means of the pins 25 so that, together with the lock washer 14, a secure
connection of the two curved sections 21 with each other and therefore also with the 1
15 and therefore also with the friction roller 1 is ensured.

In order to prevent the support 2 of Fig. 2 from rotating also, an elastic element in form of
two rubber rings 3 is installed between the segment 11 of the friction roller 1 and the
support 2. This can be seen in Fig. 8. The lock washer 14 ensures that the necessary radial
20 pressure is exerted by the two curved sections 21 on the rubber rings 3. Alternatively it is
also possible to prevent a co-rotation of the support 2 by providing an adhesive, e.g. a
permanently elastic adhesive tape, between the friction roller 1 and the support 2.

Fig. 5 shows the lock washer 14 of Fig. 2 serving to attach the curved sections 21 to the 1 to the 1; together with the two pins 25 (see Fig. 3).

Fig. 6 shows one half of a ring-shaped support 2. The curved sections 21 of the support 2
5 are designed so that each covers more than 180° , as can be seen in Fig. 6. This has as a result that when the section 21 is mounted on the friction roller 1 it clips itself automatically on the friction roller 1 thanks to this configuration. In order to prevent co-rotation it can be either supported on elastic elements or bonded as mentioned earlier. In order to produce sufficient tension when rubber rings are used, the curved section 21 may
10 not be exactly circular or as large as the friction roller 1, but somewhat compressed, so that a secure assembly on the friction roller 1, held by spring force is made possible.

Fig. 7 shows a perspective view of the curved section 21 of Fig. 6. As can be seen in Fig. 7, the one end of the curved section 21 has a recess while the other end has a
15 protuberance 32. Two such curved sections 21 thus engage each other by their recess 31 and protuberance 32 so that both curved sections 21 constitute a complete, ring-shaped support 2. The outside of the curved sections 21 is provided according to the invention with a friction coating that has been applied according to the invention. The projections 33 as well as the protuberance 32 on the left and right side of the recess 31 thus constitute
20 a clip connection with the friction roller 1, so that the curved section 21 can be attached most advantageously and well on the friction roller 1.

Fig. 8 shows how a segment 11 of the friction roller 1 as mentioned earlier, whereby a depression 13 is formed in the region where the support 2 is to be installed and into

which the support 2 is inserted. Due to the presence of a border 15 it must be a slit support 2 in one piece or a support 2 consisting of curved sections 21 so that the assembly of the support may be possible. Two mortises are drilled into the recess 13 and contain two rubber rings 3 ensuring a friction connection between the friction roller 1 or its segment 11 and a support 2 mounted on the segment 11.

Fig. 9 is an enlarged drawing of the ends of two curved sections 21 configured so that the two sections 21 can be joined together into a closed ring without any other means. Here the two segments are identical so that each has one part of a clip connection. The two sections 21 are connected to each other interlockingly by the clip connection. To install such a support 2 on the friction roller 1, the two sections 21 are placed on the friction roller and are then joined together under pressure, with the clip connections snapping in. This is done advantageously on a friction roller 1 or on its segment 11 as shown in Fig. 8. The rubber rings 3 enable the deformation of the sections 21 in radial direction that is necessary to allow the clip connection to snap in. Furthermore the rubber rings 3 maintain thereafter a tension in this process that results in a friction connection between support 2 and friction roller 1. This connection thus ensures during the operation of the friction roller 1 that no relative movement can occur between the support 2 and the friction roller 1.

Fig. 10 shows another example of an embodiment of the invention in which the section 21 of a support 2 reaches around the friction roller 1 by more than 180° . The section 21 can be snapped in over the friction roller 1. The section 21 can be snapped in over the friction roller 1 as described earlier. The ends 35 and 36 of the section 21 are at an angle

relative to the roller axis. This makes an especially easy production of the section 21 possible. It can be cut out from a ring, for example, whereby both halves can be used. The angular position of the ends 35 and 36 is advantageously at an angle with the roller axis ensuring that the yarns do not get caught in the gap between the two halves in course
5 of being wound up on a bobbin.

The present invention is not only limited to the embodiments shown. Variations, in particular regarding the configuration of the interfaces are also within the scope of the invention insofar as they are covered by the claims.

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